

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : JONES, P. et al.
Serial No. : 09/576,949
Filed : May 23, 2000
For : IMPROVED RESERVOIR
MODELING METHODS
Examiner : Dwain M. Craig
Art Unit : 2123

ATTY DOCKET: 203,818

May 20, 2004

RESPONSE

This responds to the office action of November 20, 2003 in which the following issues were raised:

1. The Abstract

It was noted that no Abstract was submitted with the application file. An Abstract is attached.

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2. Nonstatutory Double Patenting Rejection

A nonstatutory, obviousness-type double patenting rejection was based on USP 5,866,814. This patent is commonly assigned to the owner of the present application. A terminal disclaimer in compliance with 37 CFR 1.321(c) was suggested. For the reasons set forth in detail below, we believe that this ground of rejection is not appropriate and must be withdrawn. In this regard, claims 2-8 depend from claim 1; and claim 9 is also directed to a method of normalizing POPI data for comparative purposes. However, the remaining claims 10-32 are neither directed to, nor do they include specific limitations to the use of a normalizing step or process. Thus, assuming the correctness of the analysis, the disclaimer would be required only for claims 1-9.

3. The §103(a) Obviousness Rejection

Independent claims 1, 9, 10, 13, 14 and 20 were rejected under §103(a) as obvious over USP 5,866,814 (Jones et al.) in view of USP 5,058,012 (Hinchman et al.). Dependent claims 2-8, 11, 12, 15-19 and 21-32 were found to define patentable subject matter.

For the reasons set forth below, we respectfully submit that the combined teachings of the two references relied upon would not have rendered the subject matter obvious to one of ordinary skill in the art at the time of the filing of this application. Reconsideration is requested.

Applicants' Invention is Directed to Entirely Different Problems and Methods Than Those Disclosed in Either USP 5,866,814 (Jones et al.) or USP 5,058,012 ("Hinchman")

Before discussing the grounds of rejection in items (2) and (3) above, we believe that it will be helpful to review the scope and subject matter of the claims of the present invention.

The present application has claims directed to methods utilizing the pyrolytic oil-productivity index ("POPI") method originally disclosed by one of the co-applicants in USP 5,866,814. We note that the '814 patent is relied upon in combination with the disclosure of the Hinchman '012 patent as rendering all of the independent claims of the present application obvious.

At the outset, it is very important to emphasize that the so-called POPI method described in the '814 patent relies on obtaining the value of $POPI_0$ for a representative sample of typically good quality reservoir rock **containing oil of known composition** from the region in which the drilling is proceeding.

It is also to be noted that of the '814 patent teaches that the method was to be used by the drilling engineers while working on a single well. The practice of the POPI method utilizes rock chips brought to the surface by drilling fluids that can be analyzed in real time so that the extent and direction of drilling could be based on this real time data. One purpose of the method was to make changes in the direction of drilling "on the fly" in order to maintain the position of the drill bit in the stratigraphic region of optimum production. (See '814 patent, column 5, lines 22-28.) Another purpose was to provide a method for determining when the wellbore proceeded from an oil-productive reservoir into a gas cap or into an oil-water contact zone. Any

comparisons of POPI data points referred to in the specification and included in the claims of the '814 patent are all gathered and calculated for the same wellbore.

In contrast, the claimed methods of the present application are directed to gathering data from different regions in order to make a comparative analysis of the relative quality of the reservoir rock from the regions. However, it is necessary for each region to have a representative good quality oil-bearing sample in order to calculate the $POPI_0$ for each region.

In the method of claims 1-9, a **normalizing factor** for each different geological region is calculated by dividing the $POPI_0$ for that region into 100. The normalizing factor for each region can then be multiplied by the POPI value for any given rock samples that have been subjected to the basic POPI analytical method disclosed in the '814 patent.

There is **no** disclosure, discussion or mention of a normalizing factor in the '814 patent.

It is to be further noted that the value of $POPI_0$ having once been calculated, serves as a standard for a given oil productive reservoir region. As noted in the method of claim 10 of the '814 patent, if a sample of rock "A" has a $POPI_a$ value that is greater than $POPI_0$, that indicates oil-productive rock at the location of the sample; if the value of $POPI_a$ lies between the value of one-half $POPI_0$ and $POPI_0$, that indicates a marginally productive reservoir rock. If the value of $POPI_a$ is less than one-half $POPI_0$, tar-occluded or other none-reservoir rock is indicated at the location from which sample A was removed.

As will be apparent from the above analysis and a side-by-side comparison of the method and purpose of applying the steps of claim 1 of the present application to that just described for claim 10 of the '814 patent, they are not at all directed to the same or even closely-related

inventions. Consideration of the above analysis of the present invention will be relied upon in discussing the two different obviousness issues discussed below.

The Non-Statutory Double Patenting Rejection is Untenable and Should Be Withdrawn

This judicially-created doctrine is grounded in a public policy the purpose of which is to prevent the unjustified or improper timewise extension of the "right to exclude" granted to a patentee and to prevent possible harassment by multiple assignees. The '814 patent to Jones et al. disclosed, for the first time, a novel means for characterizing reservoir rock which the inventors identified as the pyrolytic oil-productivity index, or POPI method.

The claims of that patent are directed to methods for gathering and preparing individual rock samples, calculating the POPI and evaluating the potential of the rock samples, (and by inference the region of the subterranean reservoir from which the samples were derived), for their oil producing potential. Furthermore, methods for calculating a new and unique "standard" identified as the $POPI_0$ were disclosed, along with methods for evaluating individual samples against the $POPI_0$ standard.

As demonstrated above, claim 1 of the present application does not overlap with the subject matter of the claims of the '814 patent. Once that patent expires, the public will be free to practice the methods described for calculating $POPI_0$ and applying the method to develop the POPI for samples in any given locations. None of the claims of the pending application, and specifically neither independent claim 1 nor claim 9, extend to the already-patented methodology of the '814 patent. The pending claims are rather directed to a new and non-obvious step of applying a **normalizing factor**. Calculating the value of $POPI_0$ is a necessary step in calculating

the value of the normalizing factor. However, merely calculating the value of $POPI_0$ by itself is not covered by any claim of the '814 patent and performing that step would not be an infringement.

Since the public policy issues underlying the non-statutory double patenting prohibition will not be raised in any way by the eventual patenting of the claims of the present application, the double-patenting rejection of claim 1 on this ground should be withdrawn. Favorable reconsideration is respectfully requested.

The Invention is Patentably Distinguishable Over The Combined Teachings of The Cited References

All of the independent claims have been rejected as obvious under §103 based upon the combination of USP 5,866,814 and USP 5,058,012 ("Hinchman"). The office action appears to rely on Hinchman for its general teaching that various kinds of data can be "normalized" for comparative purposes. As a general proposition, applicants agree that normalization of data is well-known in various fields of technology and science and can provide a useful means for comparison. Applicants do not agree, however, that the Hinchman disclosure would lead one of ordinary skill in the art to develop the particular "normalizing factor" that is taught and used by applicants in the methods of independent claims 1 and 9.

As noted above, the normalizing factor of pending claims 1 and 9 must be derived from a series of calculations. Its determination requires the preparation of a typical sample containing good quality oil from each of the regions in question, calculating the $POPI_0$ for each such regional sample, and then dividing that value into 100 to obtain the normalizing factor for the

region. Arriving at the normalizing factor requires analysis of only one sample of representative oil-bearing rock from each of the regions.

Applicants' method is in sharp contrast to that disclosed by Hinchman. A principal distinction of Hinchman's method is that it can **only** be practiced if a **computer simulation** has been prepared for some portion of the region of interest.

Our analysis of Hinchman also indicates that the following steps are required:

1. A comparison of "performance data" from pre-existing **computer simulations** in a particular geographical region. The apparently preferred "performance data" selected was the "percent pore volume of oil produced at one pore volume of fluid injected". (See column 3, lines 30-40.)
2. Next, "core data variables" or "parameters of core data" are investigated using a computer and a statistical analysis program into which are loaded a plurality of core data values. Apparently, the statistical analysis identifies which core data variables are important or otherwise related to the "performance data" chosen in step (1), above.
3. Once the important "core data variables" have been identified, a "rock index" must be calculated. Hinchman provides an algorithm for this purpose (see column 4, line 44), but each "fluid flow factor" has a different associated constant, " k_1 ", etc. Our reading has failed to turn up any explanation as to how these "k" constants are to be calculated.

4. The next step is to calculate the so-called "iso-index" as a contour on a map of the region outside of that which is been the subject of a computer simulation.

An essential aspect of the Hinchman disclosure is the availability of a pre-existing computer simulation for a representative portion of the geographical region of interest. Applicants' claimed methods do not require or use any computer simulations.

Also required is representative "core data". This means data derived from core samples obtained during geological surveys of the region. Core samples are commonly obtained over literally hundreds, if not thousands of vertical feet. As will be apparent to one of ordinary skill in art, the Hinchman methodology would have to be practiced on numerous sections from each vertical collection of cores in order to obtain the necessary characterizing "core data".

These requirements and methodologies are in sharp contrast to the applicants' method which gathers rock samples during actual drilling operations. As disclosed in the '814 patent, very small quantities of rock need be preserved for testing. On the other hand, the testing of core samples involves handling cylindrical elements of rock of one to several inches in diameter (which may or may not be consolidated). Hinchman's method also involves a great deal more effort in sample preparation to obtain the "core data variables" that must be loaded into the statistical analysis program required to make the comparison and determine the relationship to the "performance data". (See step 2, above.)

Most importantly, from the standpoint of the analysis of the obviousness issue under §103 as interpreted by the courts, it is essential that some specific teaching or suggestion for

combining the disclosures of the references be apparent in the record. We respectfully submit that the combination is based only upon hindsight. When subjected to a critical analysis of the respective method claims, it becomes clear that the mere mention of "normalization" in the Hinchman disclosure would not lead one of ordinary skill in the art to derive the "normalization factor" developed by applicants from the general teaching of the POPI method in the '814 patent. Reconsideration and withdrawal of this ground of rejection of claims 1 and 9 is respectfully requested.

Independent Claims 10, 13, 14 and 20 Do Not Include the Use of a Normalization Factor

Applicants' claims 10, 13 and 14 are each directed to methods of estimating the **API gravity value** of oil contained in reservoir rock. None of these claims includes the step of calculating a normalizing factor as disclosed in claims 1 and 9. The methods of claims 10, 13 and 14 are unrelated to those disclosed in the Hinchman reference and relied upon in the office action as supporting the §103 rejection. Hinchman does not even mention API gravity values.

Each of these claims also involves the step of fitting a logarithmic curve to each of a plurality of separate graphic plots derived in the method steps. There are no teachings or suggestions in either of the cited prior art references that would lead one of ordinary skill in the art to the practice of these steps.

Independent claim 20 is directed to a method for characterizing reservoir rock from a single oil well borehole. It is not directed to establishing any comparative data for different regions, as that term is used in Hinchman. Rather, claim 20 is concerned with data collected along an interval "L" defined by the borehole. The problem to be solved and the stepwise

approach to maintaining the data is completely unrelated to the problem presented by Hinchman and the method proposed for its solution.

In view of the above additional information and arguments, reconsideration and withdrawal of the rejection of independent claims 10, 13, 14 and 20 is respectfully requested.

Conclusion

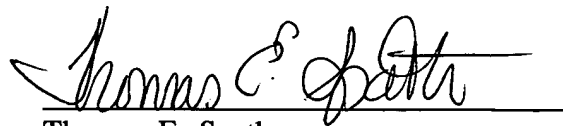
Applicants have addressed each of the issues raised in the office action. In view of the differences in the subject matter presently claimed and that of the '814 patent, the requirement for a terminal disclaimer has been shown to be unnecessary and should be withdrawn. It has also been demonstrated that no basis exists for combining the teachings of the two references relied upon in the obviousness rejection under §103(a).

As demonstrated by the above discussion and argument, all of the claims are allowable and issuance of a notice to that effect is respectfully requested.

Respectfully submitted,

ABELMAN, FRAYNE & SCHWAB
Attorneys for Applicant

By



Thomas E. Spath
Reg. No. 25,928
150 East 42nd Street
New York, New York 10017-5612
Tel. 212-949-9022